NOVIKOV, I.I., CHERNOUSOVA, K.T.

3

TRANSACTIONS OF THE INSTITUTE OF NUCLEAR PHYSICS (TRUDY INSTITUTA YADERNOY FIZ IKI) of the KAZAKH Academy of Sciences, Volume 2, by Different authors, Kazakh Academy of Science Publishing House ALMA-ATA, USSR, 1959.

Mechanical properties of Al-Sn alloys in a solid liquid state.

Influence of Fe, Si, and Mn admixtures on the heat breakage and mechanical properties of Al-Cu alloys near the solidus.

36810
S/137/62/000/004/096/201
A052/A101

18.1220

AUTHORS: Chernousova, K. T, Presnyakov, A. A.

TITLE: On the problem of ductility of copper-aluminum alloys. (A short report)

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 4, 1962, 25-26, abstract 4I150 ("Tr. In-ta yadern. fiz. AN KazSSR, no. 4, 1961, 9-14)

TEXT: The investigations were carried out on Cu-Al alloys melted in graphite crucibles out of the following initial materials: Cu of Mo grade and Cu-50%Al additional alloy to produce A-1 and AB 000 (AV000) (for the alloy with 12% Al) aluminum was used. Samples of 5 x 2 mm in diameter were tested on tension in a cast state at 100 - 800°C after a preliminary 15 minute exposure to the testing temperature. The Cu-12% Al alloy was tested in a cast state, in a hardened at 700°C state after a 40-hour exposure to this temperature, and in a diffusion-annealed state (40 hours at 700°C, 4 hours at 500°C, 8 hours at 200°C and furnace cooled). The strength of alloys decreases more slowly with the temperature in the case of low alloys. With an increase of Al content to 5-12% a sharp decrease of the strength is observed, with a transition through the

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On the problem of ductility ...

maximum at 300°C. The ductility reduces at the temperature of > 300°C and for most alloys it remains low up to 700°C; at temperatures over 500°C the ductility of homogeneous alloys increases with the increase of alloyage. The ductility of Cu-12%Al alloys increases sharply from 500°C upwards. A hardened alloy is characterized by a lower ductility value. A diffusion-annealed alloy up to 400°C has a zero ductility value, at 500°C some increase is observed and at 600°C a rabbling with the preceding reduced ductility zone takes place. A high ductility is connected with the transition through the temperatures of phase transformations $\beta + \gamma \rightarrow \alpha$, $\alpha + \beta' \rightarrow \alpha + \beta$ short heating, a 15 minute exposure to the testing temperature make possible to fix at the testing temperature a certain amount of metastable phase. With an increase of temperature β_1-phase decomposes at a high rate into $\alpha + \gamma'$.

M. Matveyeva

[Abstracter's note: Complete translation]

Card 2/2

36451
S/137/62/000/003/135/191
A052/A101

18.1220

AUTHORS: Chernousova, K. T., Presnyakov, A. A.

TITLE: The effect of vanadium on the structure and properties of alloys on the copper base

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 3, 1962, 56, abstract 3I355 ("Tr. In-ta yadern. fiz. AN KazSSR, no. 4, 1961, 89-94)

TEXT: The alloys of Cu with Sn, Al or Ni with an addition of 0.1 - 1.0% V were smelted in Be oxide crucibles in the induction vacuum furnace, forged on heating up to 600 - 700°C, and annealed during 50 hours at. 800°C. The microstructure analysis and the measurement of hardness and microhardness of alloys (60 - 120 imprints per sample) have established that V does not intermix with Cu in the liquid state; in the presence of V the solubility of Al and Ni in Cu decreases, and the ductility of alloys becomes several times lower; V is not a promising addition to Cu-alloys.

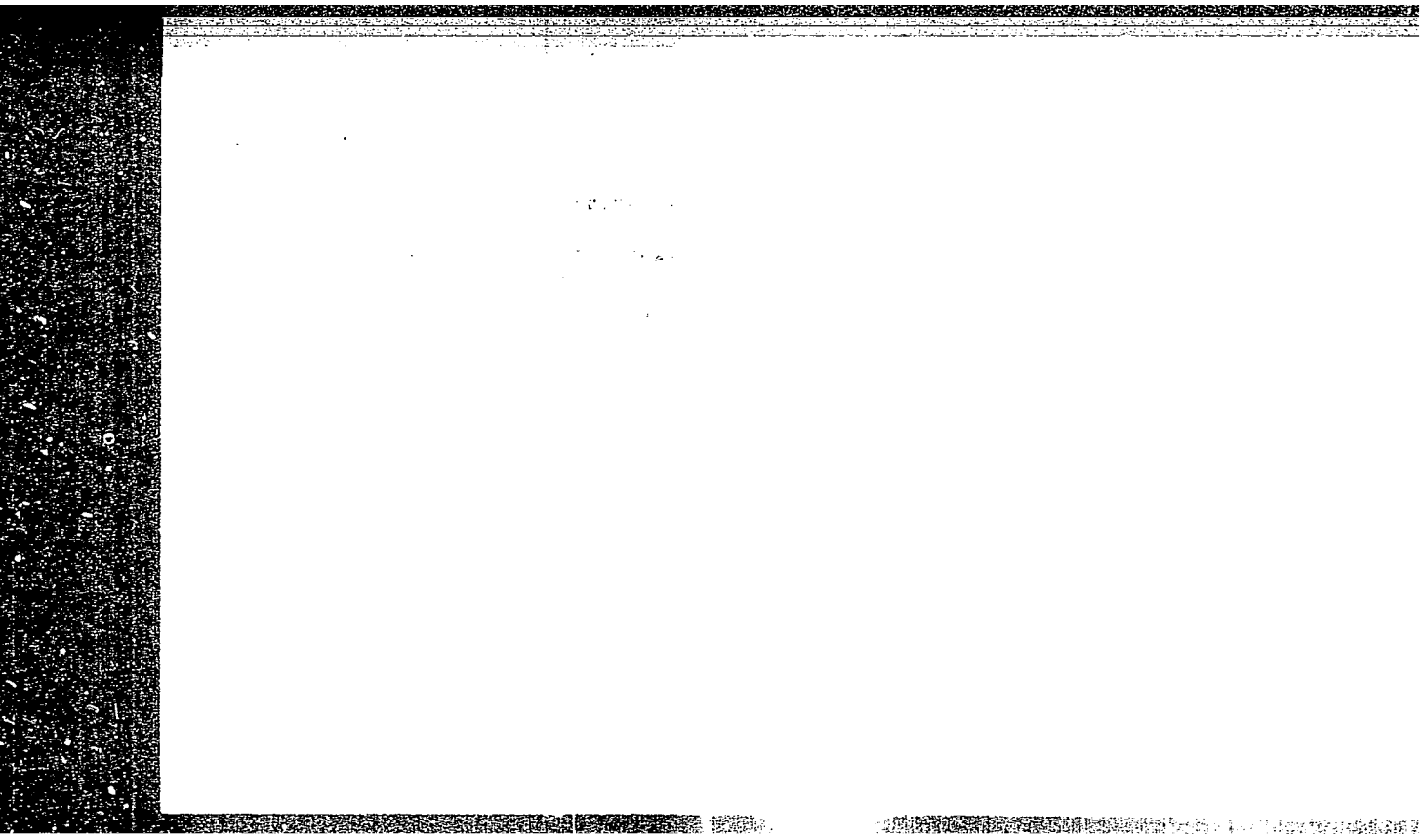
K. Povarova

[Abstracter's note: Complete translation]

Card 1/1

CHERNOUSOVA, K.T.; CHERNYSHEVA, Yu.P.

Anomalies in the properties of silicon-nickel bronze. Trudy Inst. met. i obog. AN Kazakh. SSR 7:161-165 '63. (MIRA 17:6)



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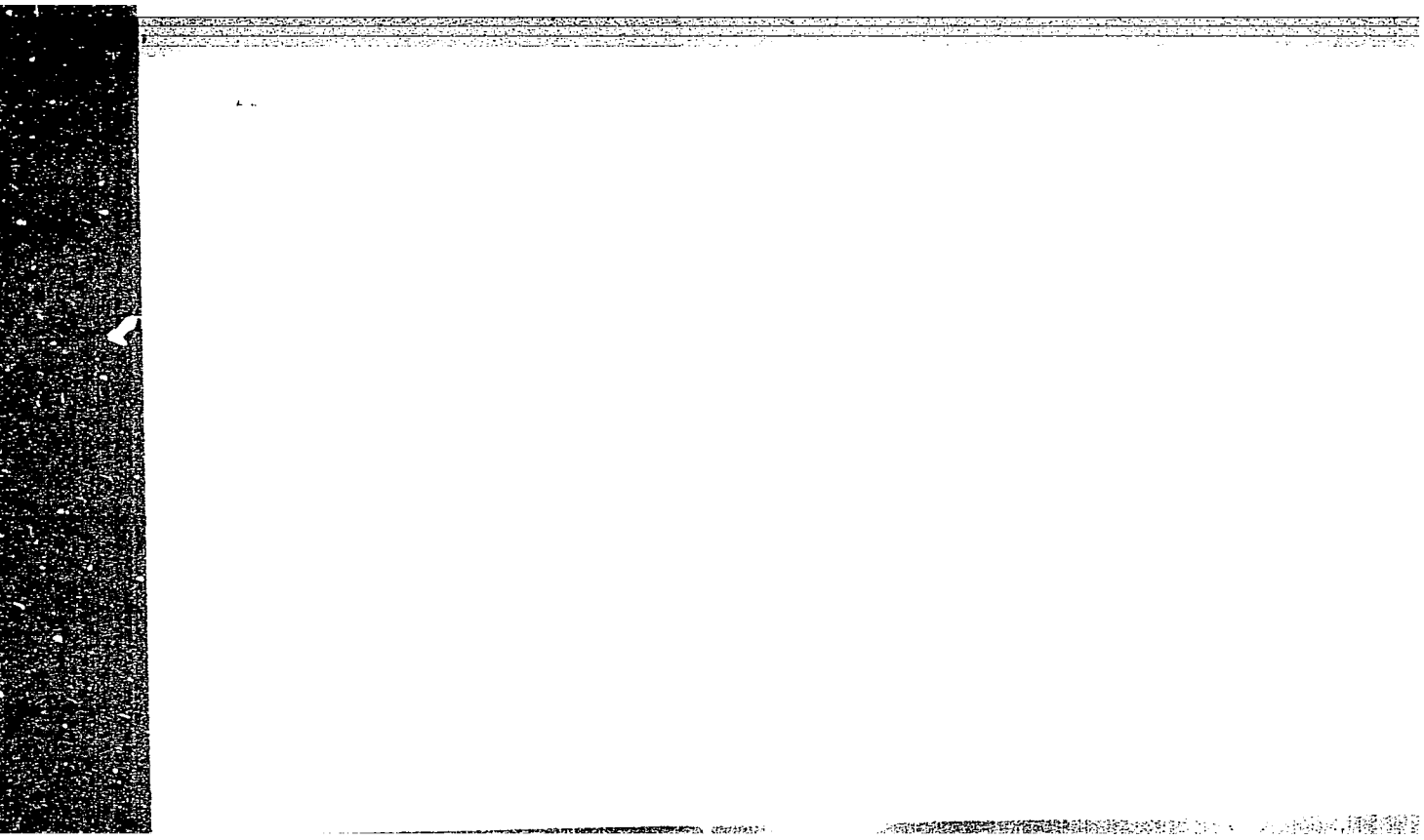

L 3661-66 EWP(e)/EWT(m)/ETC/EWG(m)/T/EWP(t)/EWP(z)/EWP(b) IJP(c) DS/JD/HW

ACCESSION NR: AP5018455 UR/0364/65/001/007/0868/0871
541.136

AUTHOR: Kabiyev, T.; Fasman, A. B.; Isabekov, A.; Chernousova, K. T.

TITLE: The effect of conditions of the genesis of Ni-Al alloy on the electrochemical activity of hydrogen diffusion electrodes

SOURCE: Elektrokhimiya, v. 1, no. 7, 1965, 868-871

TOPIC TAGS: nickel alloy, catalytic activity, electrochemistry, hydrogen gas

ABSTRACT: The conditions of the production of Ni-Al alloys may effect the extent to which such compounds as $NiAl_3$, Ni_2Al_2, NiAl and Ni_3Al have been leached out. The rate of leaching of these compounds and their catalytic activity are significantly different, and at the same time the activity of the catalyst is significantly impaired by the presence of aluminum. During hydrogenation of unsaturated compounds and in hydrogen diffusion electrodes a catalyst prepared from 1:1 Ni-Al alloy is preferred. It has the greatest stability and the necessary mechanical strength. In the present report such catalysts were prepared under different cooling rates. The effect of the conditions of crystallization on the resulting structure and activity of the skeletal nickel catalyst was investigated. The current-

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voltage characteristics of different electrodes are shown in Fig. 1 of the Enclosure. Electrodes were tested at 1.5 atm pressure of hydrogen in 30% KOH at 30—100° C. The polarizing current density comprised 100 ma/cm^2. It was found that the activity of the catalysts produced from Ni-Al alloys prepared from different methods depends on their physical parameters: grain size, extent of dendrite heterogeneity and the completeness of removal of aluminum. It was found that the activity of catalysts is directly related to the content of $NiAl_3$ phase in the starting alloy. During sintering of electrodes a partial interaction of carbonyl nickel with aluminum eutectic and with $NiAl_3$ phase takes place. Consequently, leaching is impaired. Thus, the electrochemical activity of the diffusion electrode is a function of the ratio of active nickel to bound nickel. The sharp improvement in the electrode characteristics upon electrochemical activation is apparently a result of the increase of this ratio, since all phases containing aluminum are destroyed. When the alloy is crystallized in the furnace at 300° C the reaction Ni_2Al_3 + eutectic → $NiAl_3$ is more complete. The area occupied by this phase is greater than under any other conditions. An intermetallic compound is produced with the greatest extent of dendritic heterogeneity. Such high dendritic heterogeneity facilitates a more complete leaching of the appropriate phases and increases the lifespan and stability of the electrodes. Orig. art. has: 2 tables

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L 3661-66

ACCESSION NR: AP5018455

ENCLOSURE: 01

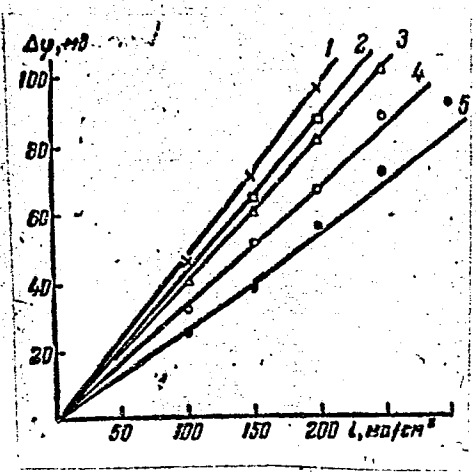

Fig. 1. Current-voltage characteristics of hydrogen diffusion electrodes at 88° C: 1--tempered from liquid; 2--standard; 3--4 hrs at 800° C; 4--cooled in air; 5--10 hrs at 300° C

Card 4/4

CHERNOUSOVA, K.T.; CHERNYSHEVA, Yu.P.

Nature of plasticity dips in KMts3-1 bronze. Trudy Inst. met. i obog. AN Kazakh. SSR 10:19-23 '64. (MIRA 18:7)

KABIYEV, T.; FASMAN, A.B.; ISABEKOV, A.; CHERNOUSOVA, K.T.

Effect of the conditions of genesis of a Ni-Fl alloy on the electrochemical activity of hydrogen diffusion electrodes. Elektrokhimiia 1 no.7[3]63-871 Jl '65. (MIRA 18:10)

1. Kazakhskiy gosudarstvennyy universitet imeni Kirova.

CHERNOUSOVA, L.N.

Use of plastics in the agriculture of capitalist countries. Plast. massy no.10:63-65 '63. (MIRA 16:10)

CHERNOUSOVA, L.N.

Study of vascular tonus and blood pressure in athetosis patients using the method of arterial oscillography. Eksp. issl. po fiziol., biokhim. i farm. no.3:69-74 '61 (MIRA 16:12)

Capillaroscopy in athetosis with spastic paralysis. Ibid.: 75-78

1. Sverdlovskiy nauchno-issledovatel'skiy institut travmatologii i ortopedii.

CHERNOUSOVA, N. A.

SOV/128-58-11-24/24

Dissertations Presented for Obtaining Scientific Degrees

for the degree of Cand. of Tech. Sci. (dates not given)

istochnikov zagryazneniya stali oksidnymi vklyucheniyami po khodu vypuska i razlivki stali); R.P. Todorov (Kiyevskiy politekhnicheskiy institut - Kiyev Polytechnical Institute) Shrinkage Phenomena in Graphite Formation Processes in Magnesium Treated Cast Iron (Usadochnyye yavleniya v protsesse grafitoobrazovaniya v chugune, obrabotannom magniyem); M.G. Trofimov (Dnepropetrovskiy metallurgicheskiy institut imeni I.V. Stalina - Dnepropetrovsk Metallurgical Institute imeni I.V. Stalin) - Investigation of Basic High-Refractory Materials Resistant in Rammed Lining of Induction Electric Steel Melting Furnaces (Izyskaniye osnovnykh vysokoogneupornykh materialov, stoykikh v nabivnoy futerovke induktsionnykh elektrostaleplavil'nykh pechey); K.T. Chernousova (Moscow Institute of Non-Ferrous Metals and Gold imeni M.I. Kalinin) Investigation of Crack Formation in Crystallization of Aluminum Alloys (Issledovaniye treshchinoobrazovaniya pri kristallizatsii alyuminiyevykh splavov); G.A. Chilingarov (Moscow Institute of Steel imeni I.V. Stalin) - On the Effect of

Card 3/4 1/2

(Liteynoye proizvodstvo, 1958, No. 11, inside back cover)

Dissertations Presented for Obtaining Scientific Degrees

the Physical Structure of Sinter on Its Metallurgical Properties (O vliyanii fizicheskoy struktury aglomerata na yego metallurgicheskiye svoystva).

1. Scientific reports

Card 2/2 ~~4/4~~

DIDKOVSKIY, Valentin Yakovlevich [Didkovs'kyi, V.IA.]; KAPTARENKO-CHERNOUSOVA, O.K., doktor geol.-mineral.nauk, otv.red.; MIL'OKHIN, I.D., tekhn.red.

[Fossil Peneroplidae from the southwestern part of the Soviet Union.] Vykopni Peneroplidy pivdenno-zakhidnoi chastyny Radians'koho Soiuzu. Kiiv, Vyd-vo Akad.nauk Ukr.RSR, 1959. 69 p. (Akademiia nauk URSR, Kiev. Instytut geologichnykh nauk. Trudy. Seriia stratigrafii i paleontologii no.28).
(Ukraine--Mollusks, Fossil)
(Moldavia--Mollusks, Fossil)

POLISHCHUK, V.V.; CHERNOUSOVA, V.M.; SHTITEL'MAN, Ye.P.

Hydrobiological and hydrochemical characteristics of the Shostka River and the effect of its pollution on the Desna River. Vop. ekol. 5:173-174 '62. (MIRA 16:6)

1. Institut gidrobiologii AN UkrSSR, Kiyev.
(Shostka River (Ukraine)--Freshwater fauna)
(Desna River--Freshwater fauna)
(Water--Pollution)

CHERNOUSOVA, V.M.

Blue-green algae, new indicators of pollution. Gidrobiol. zhur. 1 no.2:60 '65. (MIRA 18:6)

1. Institut gidrobiologii AN UkrSSR, Kiyev.

SIRENKO, L.A.; VOLKOV, I.V.; MUZYCHENKO, A.D.; ARENDARCHUK, V.V.; BRAYON, A.P.; CHERNOUSOVA, V.M.

Effect of electric current on the mass species of blue-green algae in cultivation. Gidrobiol. zhur. 1 no.4:69-70 '65. (MIRA 18:10)

1. Institut gidrobiologii AN UkrSSR; Institut elektrodinamiki AN UkrSSR i Kiyevskiy gosudarstvennyy universitet.

CHERNOUTSAN, M.A., inzh.

Tenoning parts of carpenter chairs on the two-sided "Mikhoma" tenoner. Der. prom. 8 no.9:22-23 S '59. (MIRA 12:12)
(Woodworking machinery)

CHERNOV, A.

Effective form of economic control. Vop.ekon. no.1:145-149 Ja '63. (MIRA 16:2)

(Machinery industry—Management)

KOPYLOV, M., inzh.; GINZBURG, M.; ARTAMONOVA, V.; MIKULINSKIY, A.; CHERNOV, A.; IGLIN, S.

Technical information. Okhr. truda i sots. strakh. no.4:32-49 Ap '63. (MIRA 16:4)

1. Gosudarstvennyy soyuznyy nauchno-issledovatel'skiy traktornyy institut (for Kopylov). 2. Starshiy inzh. po tekhnike bezopasnosti neftezavoda imeni XXII s"yezda Kommunisticheskoy partii Sovetskogo Soyuza, Baku (for Ginzburg).

(Technological innovations)

CHERNOV, A.; ARKHANGEL'SKIY, Yu.; GIMEYN, S., inzh (Moskva); KHAYKIN, V.; DASKOVSKIY, V.; DMITRIYEV, K.; YUDIN, G.; SHASHNIN, Yu.

Technological information. Okhr. truda i sots. strakh. 6 no.5:36-42 My '63. (MIRA 16:8)

1. Laboratoriya tekhniki bezopasnosti Gosudarstvennogo vsesoyuznogo nauchno-issledovatel'skogo tekhnologicheskogo instituta remonta i ekspluatatsii mashinno-traktornogo parka (for Gimeyn).
(Technological innovations)

CHERNOV [redacted]

Planned standard method for determining the clinkering capacity of coals. Standartizatsiia no.2:86-87 Mr-Ap '57. (MIRA 10:6)
(Coal--Testing--Standards)

AUTHOR: Chernov, A.A. 28-6-34/40

TITLE: Conference of the Work Group No.7 of the Technical Committee "Solid Mineral Fuel" (Soveshchaniye rabochey gruppy No.7 Tekhnicheskogo komiteta "Tverdoye mineral'noye toplivo")

PERIODICAL: Standartizatsiya, 1957, # 6, pp 85 - 86 (USSR)

ABSTRACT: Information is given on the ISO/TC 27 Workgroup No.7 conference on the problems of coal sampling. The conference convened in Essen, Germany. Delegations of 12 countries, including USSR, participated.

No agreement was reached on some aspects and it was decided to carry out additional investigations.

The Soviet Institute of Coal Dressing (Institut Ugleobogashcheniye), the All-Union Heat-Engineering Institute (Vsesoyuznyy teplotekhnicheskiy institut) and DONUGI will have to finish such investigations by 1 April 1958.

AVAILABLE: Library of Congress

Card 1/1 1. Industry-USSR 2. Coal-Sampling

ROZENFEL'D L., kand.khim.nauk; GEMERLING, G., kand.tekhn.nauk; CHERNOV, A., inzh.; KAPRANOV, V., inzh.; KUTINA, M., inzh.

Improving the manufacturing techniques for air-entrained fly ash concrete. Na stroi.Ros no.2:33-34 F '61. (MIRA 14:6)

(Air-entrained concrete)

KORBUT, Leonid Alekseyevich; CHERNOV, A.A., red.; YELAGIN, A.S., tekhn.red.

[Technical progress in agriculture] Tekhnicheskii progress v sel'skom khoziaistve. Moskva, Izd-vo "Sovetskaia Rossiia," 1960. 74 p. (MIRA 13:11)
(Farm mechanization)

CHERNOV, A.

On the optimum size of agricultural enterprises. Vop. ekon. no.12:145-149 D '61. (MIRA 14:11)
(Farm management--Congresses)

CHACHIN, Vasiliy Petrovich, glavnyy agronom; CHERNOV, A.A., red.; MATVEYEV, A.P., tekhn. red.; MARAKASOVA, L.P., tekhn. red.

[This too is virgin land] Eto tozhe tselina. Moskva, Izd-vo "Sovetskaia Rossiia," 1960. 37 p. (MIRA 14:5)

1. Stavropol'skoye krayevoye upravleniye sel'skogo khozyaystva (for Chachin)
(Caucasus, Northern--Agriculture)

CHANOV, Genrikh Isaakovich; CHERNOV, A.A., red.; GLUBOKOVA, N.A., tekhn. red.

[Economic accountability within the sections of collective farms in Stavropol Territory] Vnutrikhoziaistvennyi raschet v kolkhozakh Stavropol'ia. Moskva, Izd-vo "Sovetskaia Rossiia," 1961. 21 p. (MIRA 14:7)

(Stavropol Territory—Collective farms—Accounting)

CHERNOV, A.A. (Moskva)

Micron. Priroda 52 no.9:115 '63. (MIRA 16:11)

SOLOV'YEV, Aleksandr Grigor'yevich; CHERNOV, A.A., red.; AVDEYEVA, V.A., tekhn. red.

[Secret of success; a story about the expert stockbreeders of the "October 12" Collective Farm in Kostroma Province) Sekret uspekha; rasskaz o masterakh zhivotnovodstva kolkhoza "12 Oktiabr'" Kostromskoi oblasti. Moskva, Izd-vo "Sovetskaia Rossiia," 1961. 19 p. (MIRA 14:5)
(Kostroma Province--Stock and stockbreeding)

CHERNOV, ALEKSANDR [illegible] 1964

Paleontology

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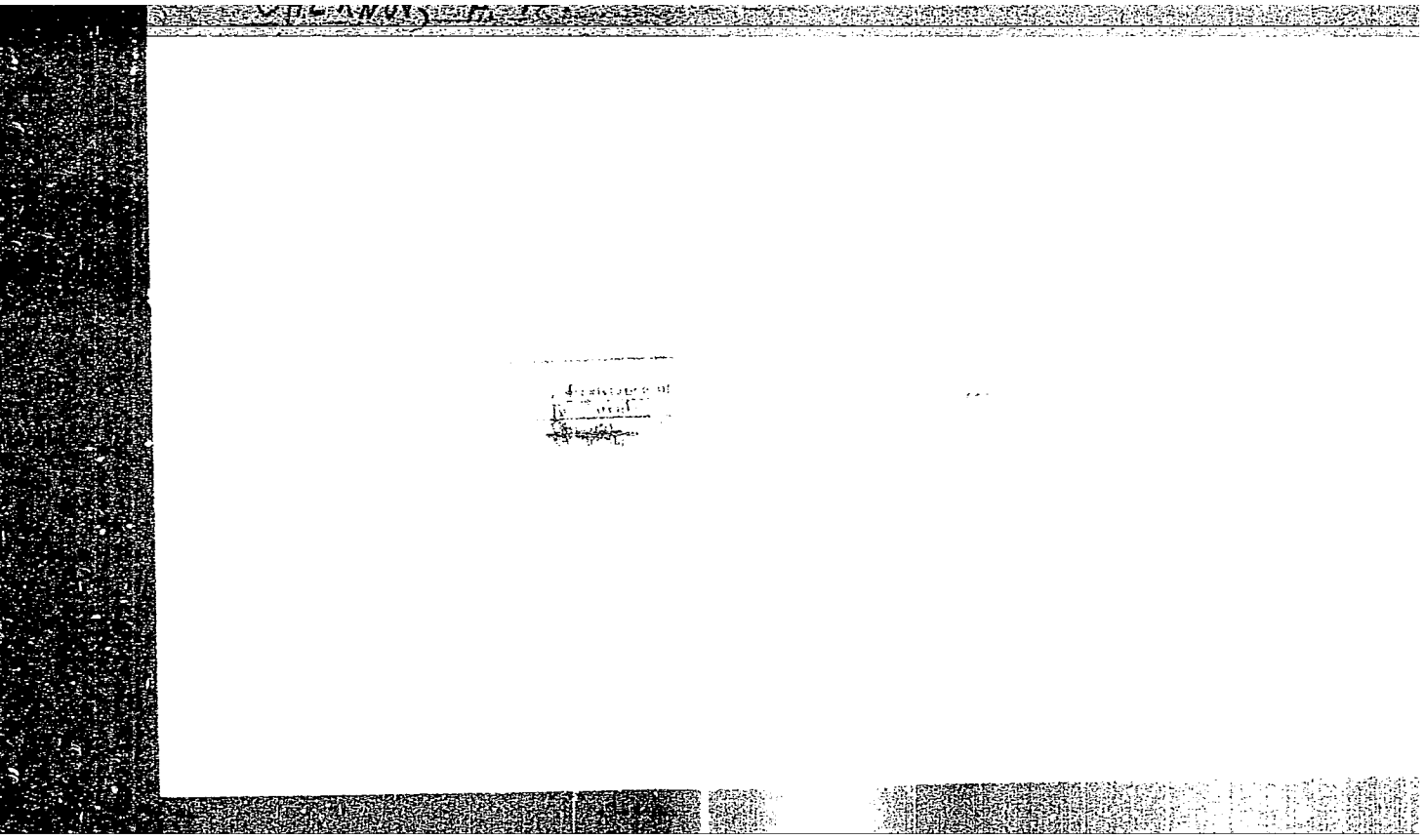

CHERNOV, A.

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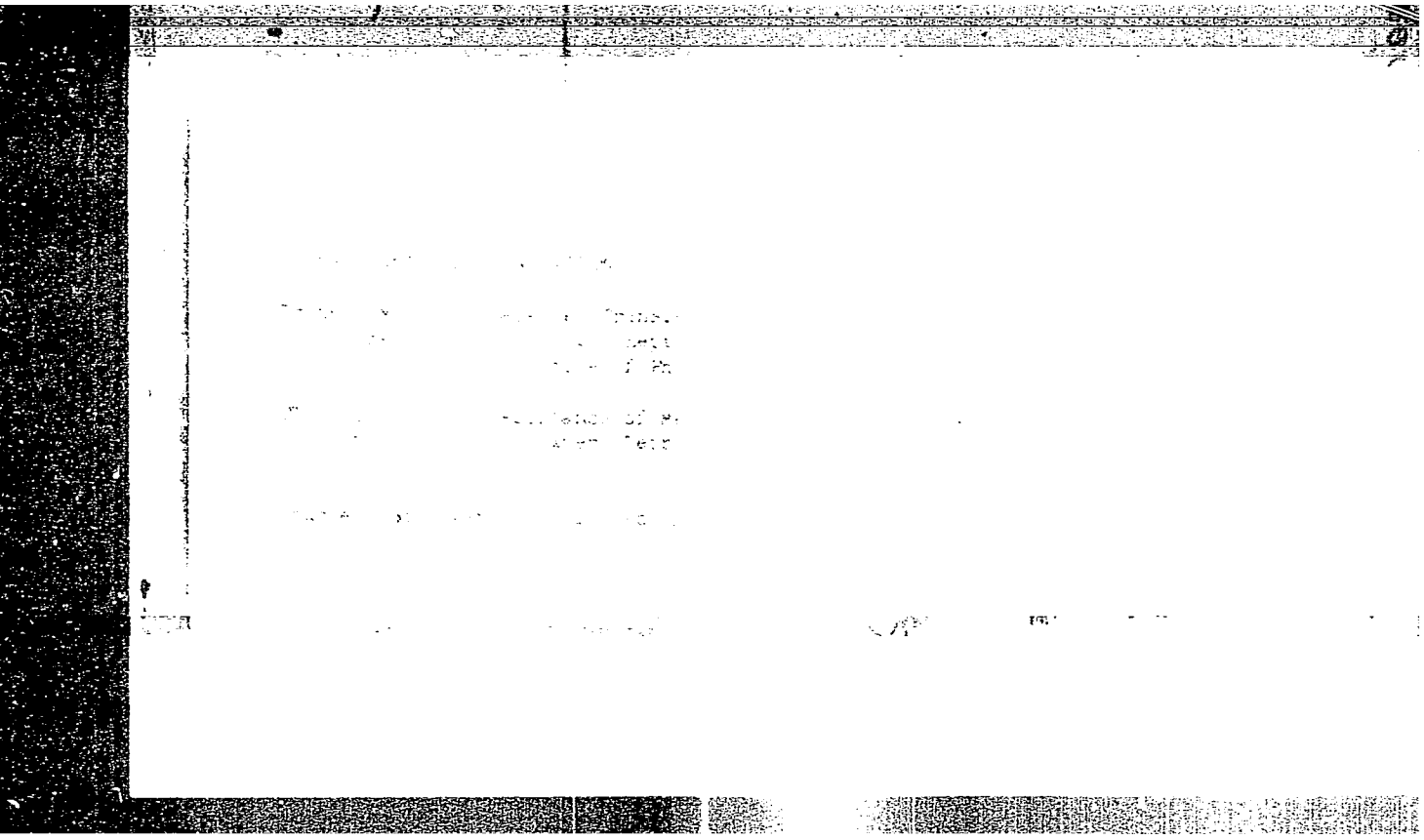

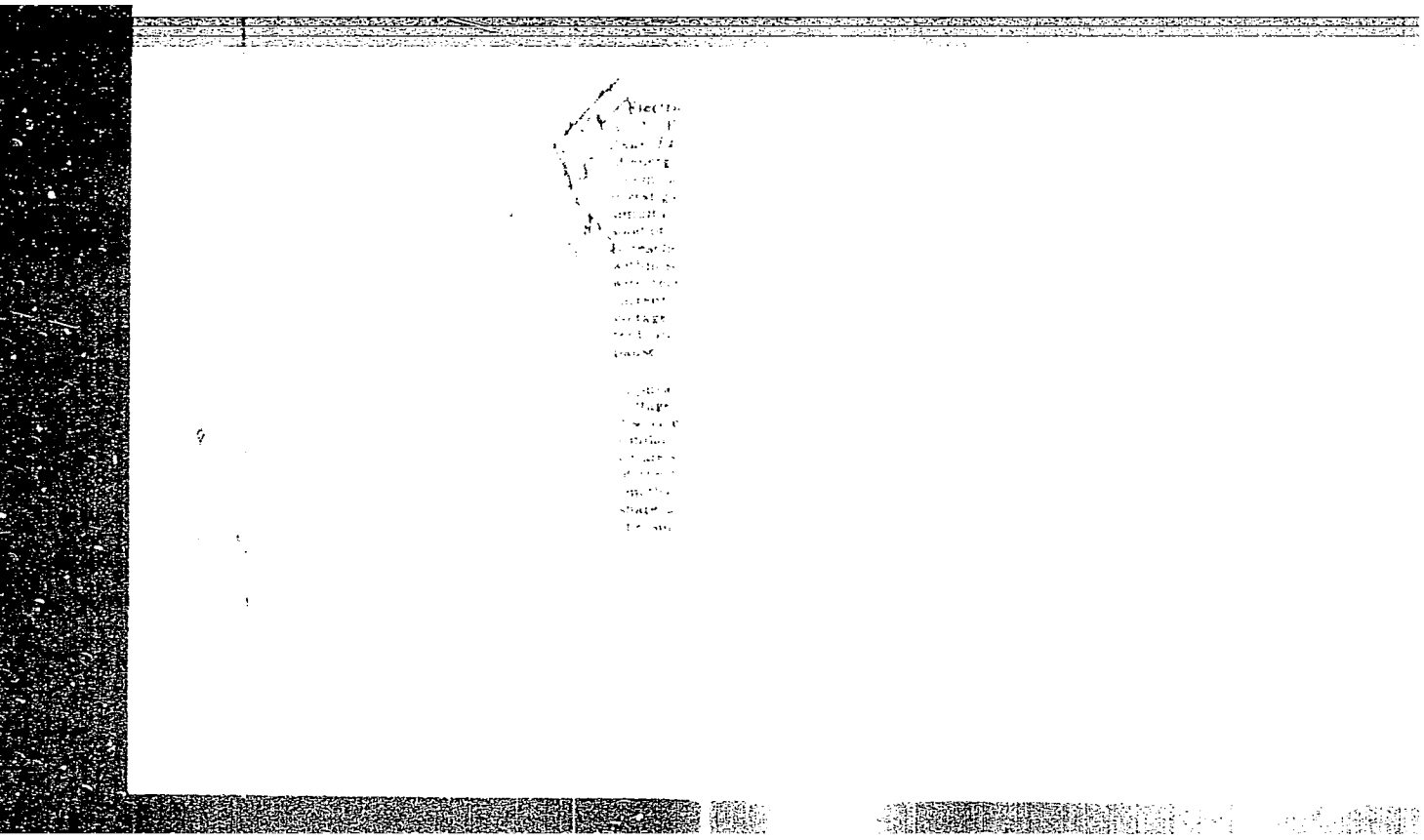

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CHERNOV, A.A.

CARD 1 / 2 PA - 1871

SUBJECT USSR / PHYSICS
AUTHOR KVARCCHAVA,I.F., BONDARENKO,V.V., PLJUTTO,A.A., ČERNOV,A.A.
TITLE The Oscillographic Determination of the Energy of the Electric Explosion of Wires.
PERIODICAL Žurn.eksp.i teor.fis,31,fasc.5, 745-751 (1956)
Issued: 1 / 1957

These oscillographic investigations took place within a relatively wide range of voltages on the condenser of the explosion circuit. By means of a "current resistance" (V.V.BONDARENKO et al., Zurn.eksp.i teor.fis,28, 191 (1955)) amperage oscillograms were obtained which are free from all inductive distortions. The energy introduced into the wire was computed solely on the basis of the amperage oscillogram, the known initial voltage on the condenser, the capacity of the condenser, and the inductivity of the induction circle. The electric explosion was caused by means of a discharge by the wire passing through a high tension condenser. The wiring diagram and the method of the experiment is described by the above cited work. Above all, copper wires were investigated because here the basic features of the electric explosion were the most distinct. These wires were 60 mm long and had diameters of 0,05; 0,1 and 0,15 mm. The capacity of the condenser battery amounted to 2,5 μ F, the initial voltage was from 5 to 40 kV, and inductivity 0,4 and 4,2 microhenry.
If the initial voltage U_o is increased or if L is diminished, the first current pulse which causes the electric explosion of the wire, becomes shorter

and higher. In the case of relatively low values of U_0 a "discharge pause" occurs after the first current pulse in the explosion circuit, which is often ended by a second , mostly stronger, current pulse. In the case of high values of U_0 this discharge pause does not occur, and amperage, after passing through a minimum that differs somewhat from zero, again begins to grow. From two amperage oscillograms it follows that the inductive and Ohm-voltage drop are of the same order. The energy E(t) introduced during the time t (calculated from the beginning of the discharge) into the wire amounts to: $E(t) = (C/2)\left[U_0^2 - (U_0 - \Delta U)^2\right] = U_0 \Delta Q - \Delta Q^2/2C$. Here ΔU denotes the reduction of the initial voltage U_0 during the time t and $\Delta Q = C \Delta U$ - the charge leaving the condenser during the same period. In the case of relatively low voltages on the condenser the electric explosion shows no anomalies whatever in the connection between the introduced energy and resistance of the wire. However, in the case of high voltages on the condenser the resistance of the wire no longer depends univocally on the energy liberated in the wire. This may be explained by the discharge of energy from the wire in the course of the explosion. The contracting effect of the magnetic field of the current limits the attainable values of current density particularly in the case of thin wires.

INSTITUTION:

BELYAYEV, L.M., doktor fiz.-matem.nauk; CHERNOV, A.A., kand.fiz.-matem.nauk

Conference on Solid State Physics. Vest. AN SSSR 34 no.3:116-117 Mr '64. (MIRA 17:4)

CHERNOV, A.A.

At a depth of 3.5 km. Okeanologiia 3 no.6:1123 '63.
(MIRA 17:4)

CHERNOV, A.A. (Moskva)

Bacterial ferments. Priroda 52 no.11:121 '63.
(MIRA 17:1)

CHERNOV, A.A.

Volumetric survey of the ocean bottom. Okeanologiia 4 no.5: 925 '64 (MIRA 18:1)

CHERNOV, A.A. (Moskva)

Meeting on the bottom of the Red Sea. Priroda 53 no.5:116-117 '64. (MIRA 17:5)

CHERNOV, A.A.

New methods of accurate measurements of water temperature.
Okeanologiia 5 no.1:179 '65. (MIRA 18:4)

CHERNOV, A.A.

An aluminum submarine. Okeanologiia 5 no.2:379 '65.
(MIRA 18:6)

CHERNOV, A.A., kand.fiz.-matem.nauk; BAGDASAROV, Kh.S., kand.khim.nauk

The colloquium "Crystal adsorption and growth" held in France. Vest. AN SSSR 35 no.10:111 O '65. (MIRA 18:10)

CHERNOV, A.A. (Moskva)

Submarine "Diogenes". Priroda 54 no.5:117-119 My '65.
(MIRA 18:5)

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CHERNOV, A.A. (Moskva)

Two days at a depth of 130 meters. Priroda 54 no.7:116-118 Jl '65.
(MIRA 18:7)

CHERNOV, A.A. (Moskva)

Deep-sea expedition "Precontinent 3." Priroda 54 no.11, 118-121 '65. (MIRA 18:11)

MOLIN, Vladimir Afanas'yevich; NOVOZHILOV, Nestor Ivanovich; CHERNOV, A.A., prof., doktor geol.-miner. nauk, otv. red. [deceased]

[Permian and Triassic bivalve branchiopods in the north of the U.S.S.R.] Dvustvorchatye listonogie permi i triasa Severa SSSR. Moskva, Nauka, 1965. 116 p. (MIRA 19:1)

L 4238-66 EWT(m)/EPA(w)-2/EWA(m)-2 IJP(c) GS

ACCESSION NR: AT5007980 S/0000/64/000/000/1080/1084 44 28 B+1

AUTHOR: Grits, Yu. A.; Iremashvili, D. V.; Naumov, A. A.; Pyatnitskiy, A. P.; Chernov, A. A.; Yudin, L. I.; Yasnov, G. I.; Panasyuk, V. S.; Ostreyko, G. N.

TITLE: Strong-current high-frequency pulse accelerators for one-revolution injection into a synchrotron 19

SOURCE: International Conference on High Energy Accelerators. Dubna, 1963. Trudy. Moscow, Atomizdat, 1964, 1080-1084

TOPIC TAGS: high energy accelerator, synchrotron, electron accelerator

ABSTRACT: Plans were begun in 1959 for the strong-current synchrotron B-3M with external injection of the electrons (Budker, G. I.; Naumov, A. A., et al., present collection, p. 1065). For this there was required an injector of electrons at currents of several tens of amperes and energy not less than 1 Mev. The time duration of the injected bunch of electrons (current pulse) must be sufficient for filling the chamber of the synchrotron, which amounts to about 20 nanoseconds in the case of equilibrium orbit length of 700 cm and relativistic electrons. The deviation from the mean energy of the electrons in a bunch must not exceed ±0.5%. The beam pulse power of the injector amounts to tens of megawatts. In order to obtain

Card 1/4

ACCESSION NR: AT5007980

such high beam power, the electric field realizes energy that is accumulated over a period of time much larger than the duration of the electron pulse. G. I. Budker and A. A. Naumov have proposed several types of accelerators which are based on this principle, which are being developed in part at the Nuclear Physics Institute, SO AN SSSR. The necessity for the rapid construction of an injector of such a type prompted the utilization of the mentioned principle, in which a radio-engineering resonant circuit serves to store the electric field energy. A similar accelerator was proposed and described by a group of authors (Tolok, V. T.; Bolotin, A. I., et al. *Atomnaya energiya* 11, 41 (1961)). In order to increase the duration of the pulse of accelerated particle current for arbitrary rigid requirements on the homogeneity of the electrons relative to energy, it was required to greatly lower the frequency of the high-frequency voltage in comparison with the case discussed in the last mentioned work (Tolok, V. T., et al.). The development of a 3.-Mev injector and current around 100 amperes was undertaken at the Physico-technical Institute, Academy of Sciences Georgian SSR, where a group of associates had proposed the design and construction of an injector forming the basis of the present development. Later, because of causes not in the control of the developers, the preparation of the injector began to fall considerably behind that of the accelerator itself. This forced a search for the possibility of producing

injectors of such type simpler to design and construct with the object of ensuring the initial cycle of work on the construction of an accelerator. In a short time the mentioned Nuclear Physics Institute prepared an injector using a long coaxial line as the resonant circuit. With the help of this injector, work was begun on the investigation of the electron-optical properties of the accelerator and channelizing structure. After about one year this injector was replaced by a more effective one, the so-called small spiral injector, which was made in the mentioned Physicotechnical Institute of the Academy of Sciences Georgian SSR. Still unbuilt is the ultimate injector with electron energy of 3.5 Mev and current around 100 amperes. The work on the injector described in the present report was carried out by A. A. Naumov. It is discussed under the topics: block scheme (self-excited generator of sub-excitation, high-frequency generator, resonant injector circuit, pulse modulator, electron beam modulator, fixation of high-frequency phase, starting accelerator pulses); design and construction; electron guns; radio-engineering devices; measurement of the parameters. In the development of the different components of the injectors mentioned in this report a number of associates took part in the work: at the Nuclear Physics Institute, SO AN SSSR (V. A. Borisov, I. A. Samokhin, V. G. Gindenko, A. P. Afonin, A. V. Makiyenko, V. P. Alekseyev, L. I. Kol'chenko) and the Physicotechnical Institute, Academy of Sciences Georgian SSR (V. I. Vishnevskiy, Ya. R. Abas-Ogly, V. Ye. Zelenin, M. I. Matrosov,

L 4238-66
ACCESSION NR: AT5007980

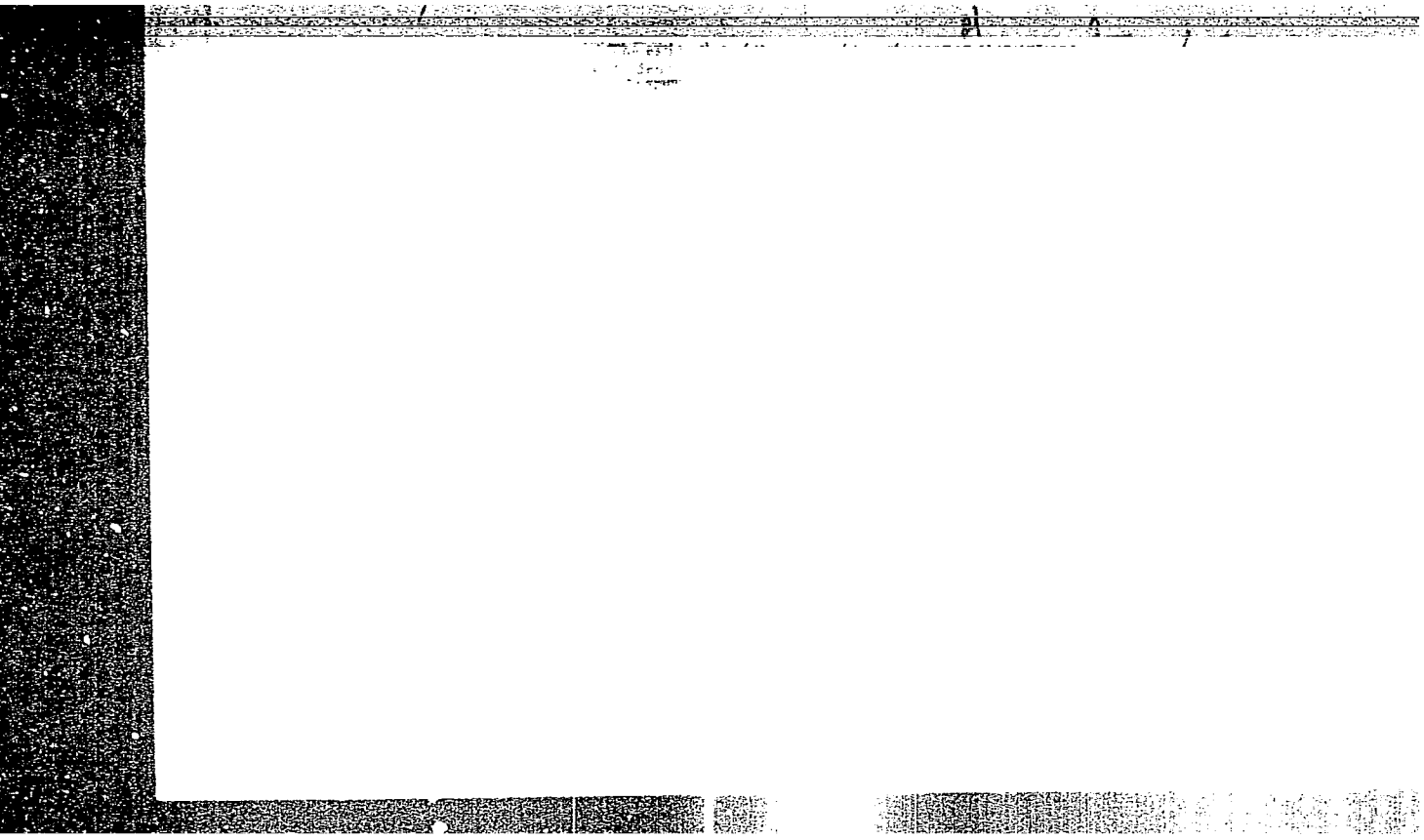
Yu. Sh. Venediktov, V. N. Rybin, G. M. Sigidin). Orig. art. has: 3 figures.

ASSOCIATION: Institut yadernoy fiziki SO AN SSSR (Nuclear Physics Institute, SO AN SSSR)

SUBMITTED: 26May64 ENCL: 00 SUB CODE: NP

NO REF SOV: 003 OTHER: 000

Card 4/4



APPROVED FOR RELEASE: 06/12/2000 CIA-RDP86-00513R000308530002-0"

CHERNOV A. A.

USSR/Physical Chemistry - Crystals, B-5

Abst Journal: Referat Zhur - Khimiya, No 1, 1957, 282

Author: Chernov, A. A.

Institution: None

Title: On the Tangential Velocity of the Growth of Elementary Layers at the Surface of Crystals

Original Periodical: Kristallografiya, 1956, Vol 1, No 1, 119-122

Abstract: The kinetics of the tangential growth of elementary layers of varying thickness at the surface of a growing crystal have been investigated. The author bases his views on the concept of the existence of an adsorption layer at the crystal boundary. The rate of growth of the layers is discussed on the basis of the theory of Frank, Barton, and Cabrer (Phil. Trans., 1951, A243, No 866, 299) and on the assumption that molecular diffusion exists also in the lateral surface-absorbing phases. On the basis of the concept of "creeping" molecules is introduced a formula giving the dependence of the displacement of the front

Card 1/2

USSR/Physical Chemistry - Crystals, B-5

Abst Journal: Referat Zhur - Khimiya, No 1, 1957, 282

Abstract: of the elementary layer from its thickness. The rate of growth of elementary layers for crystals of n-toluidine has been calculated and a comparison of the theoretical and the experimental data has been carried out.

Card 2/2

CHERNOV, A.A. ~~CHERNOV, A.A.~~ CARD 1 / 2 PA - 1870

SUBJECT USSR / PHYSICS
AUTHOR ČERNOV, A.A.
TITLE On the Motion of Inclusions in Solids.
PERIODICAL Žurn.eksp.i teor.fis, 31, fasc.4, 709-710 (1956)
Issued: 1 / 1957

Let it be assumed that in an infinitely extended isotropic solid there exists a spherical solid inclusion which is filled with a liquid or with a gas, and in which the material of the solid possesses a noticeable solubility under the given conditions. Let it further be assumed that within the body a temperature gradient ∇T, which is constant in infinity, is maintained. The present work investigates the displacement of the inclusion under the effect of this gradient. In a solid such a displacement is possible only by a transfer of the substance within this inclusion. A hydromechanic mechanism like the rising of a bubble in a liquid is excluded. The viscous flow of the crystal is neglected. In the case of the presence of a thermal field alone in the aforementioned transfer it is connected with the difference of the saturated concentrations of the solution at the cold and at the hot end of the inclusion, and the transfer is purely diffusion-like. (Other fields in general cause other flows). Every element of the surface forming the boundary of the inclusion has the velocity $\vec{v} = (D/Q) \nabla c$. Here Q denotes the density of the substance of a solid; ∇c - the concentration gradient of this substance in the material with which the inclusion is filled, which is taken to be in the vicinity of the investigated part of the surface; D - the coefficient of

the diffusion. The concentration c in general depends on the coordinates and on time and is determined by a system of diffusion equations and heat conduction equations (together with corresponding conditions on the separation boundary). These equations and boundary conditions are explicitly given and transformed for that system of coordinates, in which the inclusion rests. In the approximation under investigation here, concentration and temperature of the LAPLACE equation will be sufficient. As long as the gradient ∇T is small, the modification of temperature along the separating surface remains small. On the boundary of the domain concentration is proportional to temperature. As, however, concentration and temperature satisfy the same equation, the aforementioned proportionality between these two quantities applies everywhere within the inclusion (independent of its boundary surface). The formula obtained for the displacement velocity of the inclusion is explicitly given; according to it this displacement velocity does not depend on the dimensions of the inclusions. In substances whose solubility in the material of the inclusion increases with temperature, the inclusions move in the direction of the temperature gradient. A similar process takes place on the occasion of the transfer of matter in a liquid medium from a warmer to a colder crystal.

INSTITUTION: Institute for Crystallography of the Academy of Science in the USSR

Chernov, A.A.

70-3-18/20

AUTHOR: Lemmleyn, G.G., Dukova, Ye.D. and Chernov, A.A.

TITLE: Investigation of the dynamics of certain elementary processes of growth and evaporation of crystals. (Issledovaniya dinamiki nekotorykh elementarnykh protsessov rosta i isparemiya kristallov.)

PERIODICAL: "Kristallografiya" (Crystallography), 1957, Vol.2, No.3, pp. 428 - 436 (U.S.S.R.)

ABSTRACT: Analysis of the chemical structure of certain crystals, described in earlier papers of the authors (1 - 3), led to the conclusion that it is necessary to investigate experimentally the elementary processes, their layer-spiral growth and evaporation. Investigation of the elementary phenomena taking place at the crystal surface is particularly useful since it permits obtaining directly data on factors which play a predominant rôle in the kinetics of phase transformation. Such experiments also permit direct verification of the validity and the limits of applicability of modern conceptions relating to the kinetics of the growth of the crystals. In this paper the results are described of studies by means of micro-filming of the formation of helical dislocations and of the mutual approach and cancellation of two dislocations with opposite signs. The authors investigated the dependence

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Investigation of the dynamics of certain elementary processes of growth and evaporation of crystals. (Cont.)

and the velocity of displacement of a front of a growing layer on its thickness and the results obtained for naphthalene, diphenine and paratoluidine are plotted in the curve, Fig. 2, and expressed by the eqn. (1), p. 430. The authors also investigated the behaviour of melt drops on the crystal surface and their interactions with the forming layers. These are described and also results of observations relating to layer-spiral evaporation. Finally, the authors give a brief semi-quantitative analysis of the non-steady state processes of growth and evaporation as applied to the transition from the helicoid of growth to the helicoid of evaporation. There are 8 figures and 13 references, 8 of which are Slavic.

ASSOCIATION: Institute of Crystallography (Institut Kristallografii AN SSSR)

SUBMITTED: February 22, 1957.

AVAILABLE: Library of Congress

CHERNOV A.A.

20-6-17/47

AUTHOR: Chernov, A. A.

TITLE: A Kinetic Equation for the Layers Forming on the Surface of a Growing Crystal (Kineticheskoye uravneniye dlya stupeney na poverkhnosti kristalla)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 117, Nr 6, pp. 983 - 986 (USSR)

ABSTRACT: The at present existing theory of the layer-like spiral growth of the crystals mainly describes the behavior of the individual layers, but does not deal in detail with the problems of the interaction of these layers. Therefore it is of interest to develop the statistics of the steps on the surface of a crystal. The author first investigates the unidimensional problem. An echelon, infinite on both sides, of parallel steps whose height is due to chance is assumed. As the steps will coagulate during the growth, their number will decrease and their average height will increase. The author here attempts a quantitative description of the course of this process. Two effects are to be taken into account: 1) the increase in the number of steps with the height n in mergers of the steps with the heights ν and ν', so that $\nu + \nu' = n$ applies; 2) the decrease in the number of steps with the height n by their mergers with other steps. The steps with small n rapidly coagulate

Card 1/3

A Kinetic Equation for the Layers Forming on the Surface of a Growing Crystal

and do not play an important part. By taking into account the two above-given effects a nonlinear integro-differential equation is obtained. The complete solution of this integro-differential equation evidently is very difficult and the author here restricts himself to the determination of the law of the growth of the average dimension n of the steps. By direct calculation may be shown that the sum of the heights of all steps intersecting the unit distance remains equal. Then an approximate expression for the dependence of the speed on their height is given. The speed of the highest steps are supposed to be less dependent on their height. This may be qualitatively taken into account in the case under review. In the initial stage of the process the average height of the steps like $\sim\sqrt{t}$ increases with increasing time, and their total density decreases in proportion with $1/\sqrt{t}$. The results found here can be used for the description of the occurrence of the roughness on the surface of a polished, monocrystalline sphere. The behavior of the steps on a crystalline surface is in some quite simple cases statistically described by means of a kinetic equation described here. The kinetic equation here discussed is also suitable for the description of the coagulation processes in a system of any particles which move in one direction with different velocities. There are 11 references, 10 of which are Slavic.

Card 2/3

20-6-17/47

A Kinetic Equation for the Layers Forming on the Surface of a Growing Crystal

ASSOCIATION: Institute for Crystallography AN USSR
(Institut kristallografii Akademii nauk SSSR)

PRESENTED: July 11, 1957, by A. V. Shubnikov, Academician

SUBMITTED: July 10, 1957

AVAILABLE: Library of Congress

Card 3/3

CHERNOV, A.A

LEMMLEYN, G. G., CHERNOV, A. A.

Institute of Crystallography of Acad. Sci., USSR, Moscow.

"Kinetic Equation for Steps on a Crystal Face."
Paper submitted at
Program of the Conference on the Non-Metallic Solids of Mechanical Properties. Leningrad
May 19 -26, 1958 (paper presented)

CHERNOV, A. A.

"A Kinetic Equation for "Steps" on the Crystal Surface."

report presented at the Conference on Investigation of Mechanical Properties of Non-Metals, by the Intl. Society of Pure and Applied Physics and the AS USSR, at Leningrad, 19-24 May 1958.
(Vest, Ak Nauk SSSR, 1958, no. 9, pp. 109-111)

AUTHOR: Chernov, A.A. 70-3-2-16/26

TITLE: On the Superficial Pressure in Crystals (O poverkhnostnom davlenii v kristallakh)

PERIODICAL: Kristallografiya, 1958, Vol 3, Nr 2, pp 227 - 229 (USSR).

ABSTRACT: As a result of an examination of the strained condition, connected with the physical and geometrical properties of the crystal surface, it is shown: 1) that the condition that this strained state should be isotropic leads to the same form for the surface of the crystal as the condition that its surface energy should be a minimum, that is to the equilibrium form of the crystal in the general sense. It is also demonstrated that a crystal of the equilibrium form is absolutely thermodynamically stable; 2) that the Lagrange factor in the theory of Landau has the meaning of the surface energy and 3) that the mechanism of the transformation of any crystal to the equilibrium form is determined by the anisotropic surface pressure in the body of the crystal. Acknowledgments to V.L. Ginzburg and V.L. Indenbom.
There are 1 figure and 6 references, 2 of which are Soviet and 4 English.

Card 1/2

On the Superficial Pressure in Crystals 70-3-2-16/26

ASSOCIATION: Institut of kristallografii AN SSSR
(Institute of Crystallography, Ac.Sc. USSR)

SUBMITTED: May 3, 1957

Card 2/2

LEMMLEYN, G.G., red.; CHERNOV, A.A., red.; POPOV, R.Yu., red.; SMIRNOVA, N.I., tekhn.red.

[Elementary processes of crystal growth; microphenomena occurring during crystal growth, evaporation, solution, and etching of crystals] Elementarbye protsessy rosta kristallov; mikroiavleniia, proiskhodiashchie pri roste, isparenii, rastvorenii i travlenii kristallov. Sbornik statei. Perevod pod red. G.G.Lemmleina i A.A.Chernova. Moskva, Izd-vo inostr.lit-ry, 1959. 300 p. [Collection of translated articles] (MIRA 12:9)

(Crystals)

POLTORATSKIY, Viktor Vasil'yevich; CHERNOV, A.A., red.; ROZEN, E.A., tekhn.red.

[Nest of the crystal goose; a story about the past, present, and future of the Russian glass city, the remarkable artisans and artists of Russian cut glass] Gnezdo khrustal'nogo gusia; rasskaz o proshlom, nastoiashchem i budushchem rossiiskogo steklograda, o zamechatel'nykh masterakh i khudozhnikakh russkogo khrustalia. Moskva, Sovetskaia Rossiia, 1959. 70 p. (MIRA 13:5)

(Gus'-Khrustal'nyy--Glass manufacture)

24.7100

76009
SOV/70-4-5-31/36

AUTHORS: Lifshits, I. M., Chernov, A. A.

TITLE: Macroscopic Steps on Crystal Surfaces

PERIODICAL: Kristallografiya, 1959. Vol 4, Nr 5, pp 788-791 (USSR)

ABSTRACT: The formation of macroscopic steps on crystal surfaces, whose free surface energy tends to a minimum, and the kinetics related to the stable form of steps on the faces of crystals, being grown of a gas phase or evaporated, are discussed in two dimensions. If a row with the shortest interatomic distances is X of orthogonal coordinates, a bent surface y(x) has the minimum free energy when

$$\int (F(p) + \Lambda y)\, dx = \min,\ F(p) \equiv \alpha(p)\ \sqrt{1 + p^2},$$

Card 1/4

where $\alpha(p)$ is the unit free surface energy; $p \equiv y'x \equiv \tan\varphi$; Λ is Lagrange multiplier; and φ is compliment to kink angle. Adding a few minute particles or nucleus, δN, at the kink, $x_c y_c$, the bent surface can be altered and derivatives p_+ and p_- obtained, since the added chemical potential

$$[F'_p]_{x_c} \frac{\delta y_c}{\delta N} + [F - pF'_p]_{x_c} \frac{\delta x_c}{\delta N},$$

is a finite quantity only when

$$[F'_p]_{x_c} \equiv (F'_p)_{p=p_+} - (F'_p)_{p=p_-} = 0,$$
$$[F - pF'_p]_{x_c} \equiv (F - pF'_p)_{p=p_+} - (F - pF'_p)_{p=p_-} = 0.$$

Card 2/4

Considering a number of special cases, 7 additional equations are derived which are applicable in certain cases. For instance, a stable step form develops at the crystal growth of a gas phase when

$$\frac{d}{ds}\left(J\frac{dn}{ds}\right) = \gamma(n - n_r) - \beta(n - n_{(s)}) = 0.$$

where s is the circumference of a step; n is the density of absorbed particles; n_k, n_r, $n_{(s)}$ are same in the crystal, gas phase, and at the step, respectively; D is the diffusion factor at the surface; γ is the same between the gas phase and the crystal surface; and β is the rate at which adsorbed particles turn into the solid phase. A step moves at the rate of V, defined by

$$v_0\beta(n - n_{(s)}) = V\sin\varphi.$$

Macroscopic Steps on Crystal Surfaces

76009
SOV/70-4-5-31/36

Solution of these equations in special cases is discussed and the reasons steps become curved are analyzed. There are 2 figures; and 4 references, 3 Soviet, 1 U.S. The U.S. reference is: A.J.W. Moor, Acta Metallurgica, 6,4, 293-304, 1958.

ASSOCIATION: Physicotechnical Institute of the Academy of Sciences of the Ukrainian SSR and Crystallographical Institute of the Academy of Sciences of the USSR (Fiziko-tekhnicheskiy institut AN USSR i Institut kristallografii AN SSSR)

SUBMITTED: June 10, 1959

Card 4/4

S/070/60/005/003/021/024/XX
E132/E460

AUTHOR: Chernov, A.A.

TITLE: On the Theory of "Shock Wave" Steps on the Surface of a Crystal

PERIODICAL: Kristallografiya, 1960, Vol.5, No.3, pp.446-451

TEXT: A theoretical mathematical analysis is made of the "shock waves" - step-shaped discontinuities in the crystal surface - which occur during crystallization and dissolution of a crystal. It is shown that this density jump disappears in the course of time and the time variation of this rate of disappearance is established. A qualitative calculation of the role of the surface energy of the crystal leads to the conclusion that is is possible (and indeed for large initial disturbances in the density is essential) that the transformation of density waves into stable macroscopic steps determined by the anisotropy of the surface energy should occur. The subjects of the study are macrosteps of the second kind which are relatively small concentrations or rarefactions in a uniform flow of monomolecular steps. The stability of such formations, which are density waves of elementary steps, is of a kinematic nature. Macro steps of the first kind

S/070/60/005/003/021/024/XX
E132/E460

On the Theory of "Shock Wave" Steps on the Surface of a Crystal

are steps with such steep profiles that the motion of each of its mono-molecular steps separately has no meaning. There are 2 figures and 8 references: 5 Soviet and 3 English.

ASSOCIATION: Institut kristallografii AN SSSR
(Institute of Crystallography AS USSR)

SUBMITTED: November 2, 1959

Card 2/2

LEMMLEYN, G.G.; DUKOVA, Ye.D.; CHERNOV, A.A.

Growth of crystals from vapors in the neighborhood of the critical point. Kristallografiia 5 no.4:662-665 Jl-Ag '60. (MIRA 13:9)

1. Institut kristallografii AN SSSR.
(Crystals--Growth) (Critical point)

CHERNOV, A. A., CAND PHYS-MATH SCI, "ON THE THEORY OF the LAMINAR [redacted] SPIRAL GROWTH OF CRYSTALS. [KHAR'KOV], 1960. (KHAR'KOV STATE UNIV. INST OF CRYSTALLOGRAPHY, Acad Sci [redacted] USSR). (KL, 2-61, 200).

S/020/60/132/04/23/064
B014/B007

AUTHOR: Chernov, A. A.

TITLE: The Theory of the Nonequilibrium Capture of Impurities During the Growth of Crystals

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 132, No. 4, pp. 818-821

TEXT: This paper reproduces a lecture delivered in March 1959 at the Vtoroye vsesoyuznoye soveshchaniye po rostu kristallov (Second All-Union Conference on the Growth of Crystals). The connection between the rate of growth of the crystal and the distribution of impurities in the crystal is discussed. The establishment equilibrium distribution of the impurities in the crystal at increased temperatures is dealt with. For the purpose of calculating the concentration of the impurity in the solution, the author proceeds from the diffusion equation (1) and obtains solution (7). In consideration of the periodicity of the precipitation of the individual crystal layers, equation (8) is given. The solution of this integral is carried out in zeroth approximation, and formula (10) is obtained, from which formulas (12) and (13) are obtained for various rates of growth of

Card 1/2

The Theory of the Nonequilibrium Capture of Impurities During the Growth of Crystals

S/020/60/132/04/23/064
B014/B007

the crystal for the impurity-capture coefficient. These formulas have a complicated structure and express the dependence of the coefficient of the rate of crystal growth upon the orientation of the crystal faces and on the stepped character of the crystal surface. There are 3 figures and 5 references, 4 of which are Soviet.

ASSOCIATION: Institut kristallografii Akademii nauk SSSR (Institute of Crystallography of the Academy of Sciences, USSR)

PRESENTED: January 26, 1960, by A. V. Shubnikov, Academician

SUBMITTED: January 25, 1960

/B

Card 2/2

CHERNOV, A.A.; DUKOVA, Ye.D.

Effect of supersaturation on the step contour of a crystal surface and the rate of its growth. Kristallografiia 5 no.4:655-661 Ag '60. (MIRA 13:9)

1. Institut kristallografii AN SSSR.
(Crystals--Growth) (Solutions, Supersaturated)

86377
S/020/60/133/006/026/031XX
B019/B056

24.7100

AUTHOR: Chernov, A. A.

TITLE: The Rate of the Laminary-spiral Growth of Crystals From Solution and Melt

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 133, No. 6, pp. 1323-1326

TEXT: The stepped surface of a crystal is investigated, it being assumed that the transition from solution or melt into the crystalline phase occurs at the end of these stages. The diffusion adsorption of particles on the surface is neglected. First, the growth of a crystal from a solution is dealt with; here, the author confines himself to a pure diffusional transport of the substance in the solution. The height of the steps is denoted by a, their width by λ. For the concentration of the solution, the relation

$$c(x,y) = A\ln\left|\zeta\right| + B = A\ln\sqrt{\sin^2\frac{\pi}{\lambda}x + \mathrm{sh}^2\frac{\pi}{\lambda}y} + B \qquad (2)$$

is taken in a Cartesian system of coordinates, in which the x-axis lies in

Card 1/3

The Rate of the Laminary-spiral Growth of Crystals From Solution and Melt

the plane of the crystal surface, z in the direction of the step-edges of the crystal plane, and y is perpendicular to the crystal surface; in this relation $\zeta = \sin \frac{\pi}{\lambda} z$. Herefrom, the relation

$$v = \pi\Omega\beta (c - c_e) = \frac{\pi\Omega\beta c_e}{1 + \frac{\beta_\alpha}{D} \ln\frac{\lambda}{\pi\rho_c} \operatorname{sh}\frac{\pi}{\lambda}\delta} \qquad (4)$$

for the shifting rate of the steps is obtained. $\sigma \equiv (c_\zeta - c_e)/c_e$, Ω is the specific volume of the molecules (atoms). The distance between these steps is determined by the power output of the sources of these steps, and if these sources undergo spiral shifts, the steps become spiral-shaped. Assuming that an Archimedean spiral exists, for which $\lambda = 4\pi\rho_c$, where $\rho_c = \Omega\alpha (kT)^{-1}$ is the radius of the two-dimensional crystalline nucleus and α the specific surface energy between the ends of the steps and the solution, a formula is given for the normal rate at the steps. An analogous investigation is carried out for the growth of a crystal from a melt. M. I. Kozlovskiy and G. Bliznakov are mentioned. There are 2

86377

The Rate of the Laminary-spiral Growth of Crystals From Solution and Melt S/020/60/133/[illegible]/026/051XX
E019/E05[illegible]

figures and 9 references: 2 Soviet, 5 US, and 1 German.

ASSOCIATION: Institut kristallografii Akademii nauk SSSR (Institute of Crystallography of the Academy of Sciences USSR)

PRESENTED: April 9, 1960, by A. V. Shubnikov, Academician

SUBMITTED: April 5, 1960

Card 3/3

s/058/62/000/005/071/119
A061/A101

24.7000
19.9500

AUTHOR: Chernov, A. A.

TITLE: Effect of impurities on the rate of crystal growth

PERIODICAL: Referativnyy zhurnal, Fizika, no. 5, 1962, 11, abstract 5E88 (V sb. "Rost kristallov. T. 3", Moscow, AN SSSR, 1961, 47 - 51. Discuss., 214 - 218)

TEXT: The generally accepted notion of the inhibiting effect of an impurity on crystal growth, because of adsorption on the crystal surface, is true only at certain ratios between the velocity of motion of the step in the crystal growth process and the lifetime of the impurity adsorbed. As is known, the growth-inhibiting mechanism does not work if the impurity concentration is very low. In this connection, the inhibiting effect is explained by the trapping of the impurity by the step itself ("step doping") and by its local fixation ("step curvature"). Qualitative formulas relating the general velocity of motion of the step to the density of the doped zones in it are given.

K. Gurov

[Abstracter's note: Complete translation]

Card 1/1

S/058/62/000/005/072/119
A061/A101

24.7000
18.9500

AUTHOR: Chernov, A. A.

TITLE: Nonequilibrium trapping of impurities during crystal growth

PERIODICAL: Referativnyy zhurnal, Fizika, no. 5, 1962, 11, abstract 5E89 (V sb. "Rost kristallov. T. 3", Moscow, AN SSSR, 1961, 52 - 58. Discuss., 214 - 218)

TEXT: It is noted that three zones can be distinguished in the growth of a crystal out of a liquid: the zone inside the crystal, the marginal zone, and the zone of the step (stepwise crystal growth). The position of the impurity in the three zones differs by the character of the surrounding neighbor atoms of the base crystal. From this viewpoint, the first zone is three-dimensional, the second is two-dimensional, and the third is linear. The equilibrium concentrations of the impurity in the three zones are different, and so are the times it takes for equilibrium to establish (relaxation times). These circumstances, as well as the rate of diffusion in the internal zone set the conditions for the kinetics of impurity trapping by the crystal grown out of a liquid. Qualitative formulas are

Card 1/2

S/058/62/000/005/072/119
A061/A101

Nonequilibrium trapping of...

offered for the rate at which this kind of trapping takes place.

K. Gurov

[Abstracter's note: Complete translation]

Card 2/2

S/053/61/073/002/003/003
B117/B212

AUTHOR: Chernov, A. A.

TITLE: Laminar spiral growth of crystals

PERIODICAL: Uspekhi fizicheskikh nauk, v. 73, no. 2, 1961, 277-331

TEXT: The present survey deals with investigations about laminar spiral growth of crystals and concerns the questions of a laminar growth of crystals if the rate of growth is not limited by the step formation and if the kinetics is determined: by the motion of steps already present, their shape, mutual position, height, mutual interaction, also interactions with dislocations, impurities etc. The first chapter deals with the surface structure of crystals, which are in an equilibrium with the surrounding medium. Various fundamental questions are discussed with respect to surface energy of crystals and also the problem of the origin and the stability of macroscopic steps on a crystal surface. They are: (1) elementary steps and their discontinuities; (2) surface energy of crystals and Herring's formula; (3) vertices at the profile of the crystal surface; (4) condition of surface stability; (5) equilibrium shape of an open curve. Chapter 2 deals with

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S/053/61/073/002/003/003
B117/B212

Laminar spiral growth ...

the growth of crystals in vapor. A short description is given of the atoms and molecules adsorbed on the surface, and a discussion about the dislocation of steps during the growth of crystals in the gas phase; they are: (7) dislocation of an isolated step; (8) set of parallel elementary steps; (9) normal rate of laminar spiral growth; (10) motion of macroscopic steps; (11) various experimental data; (12) evaporation. Chapter 3 deals with the growth of crystals in solutions and fuses. In the introduction it is pointed out that in practice crystals are usually grown in the liquid phase either in a solution or fuse. Numerous papers are devoted to crystallization in the liquid phase. But the growth mechanism is still less well known for the condensation phase than that for vapors. The following problems are discussed in chapter 3: (14) dislocation of a set of elementary steps; (15) normal rate of growth; (16) various experimental data; (17) growth in fuse; (18) diffusion field and rate of dislocation of macroscopic steps. Chapter 4 brings the interactions of a growing crystal with impurities; they are: (19) effect of impurities on the rate of growth. Two types of impurities are closely investigated, i.e. impurities which are capable of being adsorbed and which are captured during the growth of the crystal and such impurities which contaminate discontinuities. (20) Non-equilibrium capture of

Card 2/3

Laminar spiral growth ...

impurities during the growth of crystals; (21) origin of dislocations during the capture of impurities. Chapter 5 "etching", briefly deals with basic concepts about elementary processes of selective etching. Chapter 6 brings collective effects during the step motion. Considerations and experimental data which are found in the technical literature, point out the dependence of steplike structure of the crystal surface on the conditions of growth, e.g. supersaturation, temperature, and impurities. On the other side, the growth of crystals takes place due to step motions, and the surface structure affects the rate of growth and the properties of a crystal. Therefore, the surface structure is in some cases a connecting link between conditions of growth and properties of a crystal. The last chapter brings several formation processes of the steplike relief. The collective effects which accompany the step motion are only investigated, they are: (22) Origin, motion, and vanishing of kinematic ("shock") waves of the step density; (23) kinetic equations for steps varying in heights. A. V. Shubnikov, I. V. Obreimov, V. D. Kuznetsov, G. G. Lemmleyn, M. O. Kliya, P. I. Lukirskiy, Ya. Ye. Geguzin, N. N. Ovcharenko, G. S. Zhdanov, Minervina, Ye. D. Dukova, M. I. Kozlovskiy, D. Ye. Temkin, B. Ya. Lyubov, G. P. Ivantsov, V. R. Regel', A. A. Urusovskiy, V. N. Kolomiychuk, G. A. Martynov, S. P. Bakanov are mentioned. There are 28 figures, 1 table, and 144 references: 51 Soviet-bloc.

Card 3/3

LYUBOV, B. Ya., CHERNOV, A. A.

"Main Directions in the Theory of Crystal Growth."

report submitted for the Conference on Solid State Theory, held in Moscow, December 2-12, 1963, sponsored by the Soviet Academy of Sciences.

CHERNOV, A. A.

"On the theory of the growth forms of the crystals."

report submitted for 6th Gen Assembly, Intl Union of Crystallography, Rome, 9 Sep 63.

Inst Crystallography, AS USSR, Moscow.

S/070/62/007/005/001/014
E132/E460

AUTHORS: Belyayev, L.M., Chernov, A.A.

TITLE: The growth of crystals and the study of the kinetics of their formation

PERIODICAL: Kristallografiya, v.7, no.5, 1962, 659-663

TEXT: "Editorial review", exhorting attention to general and specific topic in crystal growth such as:
Nucleation of crystals, mechanism and kinetics of the motion of interphase boundaries, formation of metastable (for example defective) crystal structures at finite rates of growth.
1) Nucleation. The use of the electron microscope to obtain information on the microstructure of nuclei is urged. The quantitative dependence of nucleation on conditions (transport, temperature, concentration etc) in the mother liquor must be found.
2) Growth rates. Studies of the microprocesses at the boundaries and of the bulk process (heat flow in mother liquor, material transport etc) are needed.
3) Defect formation: microscopic and macroscopic defects. Interaction of impurities with the growing crystal.

The growth of crystals ... S/070/62/007/005/001/014
E132/E460

The effect of impurities on the dislocation structure. The production of dislocation-free crystals. Special demands: production of crystals of super-pure materials by methods not employing crucibles. Improvements to the Verneuil method. Zone melting. Crystallization with a steep temperature gradient. Growth from non-aqueous solutions. Crystallization as a result of chemical reactions. Development of control devices for regulating crystallization. Obtaining thin single crystal layers of semiconductors etc. Liquidation of gaps between theory and practice. For the successful solution of problems of growth kinetics it is necessary to organize interdisciplinary collectives.

Card 2/2

CHERNOV, A.A.

Use of the method of characteristics in the theory of crystal shapes. Kristallografiia 8 no.4:499-505 Jl-Ag '63. (MIRA 16:9)

1. Institut kristallografii AN SSSR.
(Crystals—Growth)

43506
S/070/62/007/006/009/020
E132/E435

AUTHOR: Chernov, A.A.

TITLE: The kinetics of the formation of the growth forms of crystals

PERIODICAL: Kristallografiya, v.7, no.6, 1962, 895-898

TEXT: The kinematic equation for the growth form of a crystal, taking account of the crystallographic anisotropy in the growth rate and the nonuniformity over the supersaturation over its surface, is written down. Over the surfaces of small crystals the supersaturation is constant and the form of the crystals is built up according to Vulf's law for the diagram of growth rates. At low temperatures the growth form is a polyhedron. V, the rate of growth along the normal $\underline{n}$ to the surface, is a function of $\underline{n}$ and s, the supersaturation, which is itself a function of $\underline{r}$ the position and t the time. V may be anisotropic because of the anisotropy of the surface energy $\alpha(\underline{n})$. $\underline{r}$ is the direction of the trajectory in which a growing point moves. It is found that

$$\left(\frac{\partial \underline{r}}{\partial t}\right)_n = \underline{e}V_e$$

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where $\underline{e}V_e$ is the rate of movement of a point of the surface along the trajectory. $V_e^2 = V^2 + (dV/d\varphi_1)^2 + (dV/d\varphi_2)^2$ where φ is the angle with arbitrary coordinate axes. It is further assumed that the concentration obeys Laplace's equation and for small crystals it is found that $V(\underline{n}) = W\beta(\underline{n})(c_\infty - c_e)$ where W is the specific volume of the particle in the crystal, $\beta(\underline{n})$ is the kinetic coefficient characterizing the rate of elementary processes on the surface of the crystal and c is the concentration of the solution over the surface, c_e in equilibrium conditions, c_∞ far away from the crystal. There are 3 figures.

ASSOCIATION: Institut kristallografii AN SSSR
(Institute of Crystallography AS USSR)

SUBMITTED: January 20, 1962

CHERNOV, A.A. (Moskva)

Bathometer-thermobathygraph. Priroda 51 [i.e. 52] no.5:104 '63. (MIRA 16:6)

(No subject headings)